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मानक

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“जानने का अधिकार, जीने का अधिकार”

Mazdoor Kisan Shakti Sangathan

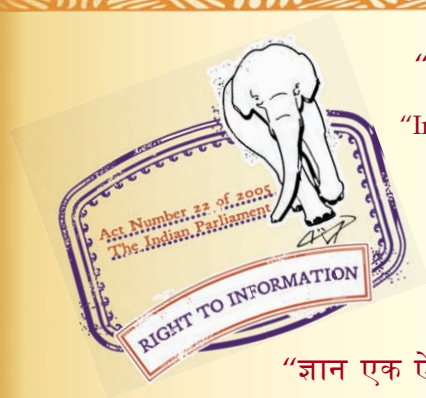
“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

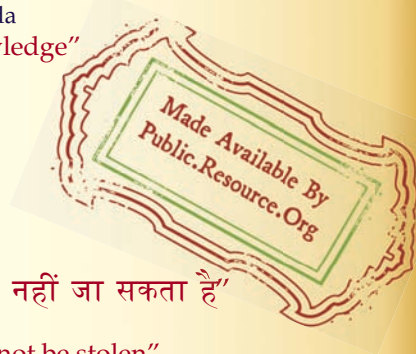
IS 10810-9 (1984): Methods of test for cables, Part 9: Tear resistance for paper insulation [ETD 9: Power Cables]



“ज्ञान से एक नये भारत का निर्माण”

Satyanarayan Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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Indian Standard

“पुनर्परीक्षा”
“RE-AFFIRMED 1996”

METHODS OF TEST FOR CABLES

PART 9 TEAR RESISTANCE FOR PAPER INSULATION

1. Scope — Covers the method for determining the force required to tear a specimen of cable insulating paper.

2. Significance — Paper when used in the manufacture of electric cables, is applied over the conductor by wrapping process in the form of tape of suitable widths, with angular feed, and consequently is susceptible to tearing. A similar phenomenon occurs when the cable using the paper, is subjected to bending while handling and installation. Therefore, it is pertinent to determine the tear strength of paper. Tearing resistance is usually greater in cross direction than in the machine direction of the paper.

3. Terminology

3.1 Machine Direction — The direction of paper corresponding to the direction of the flow of the stuff on the paper machine.

3.2 Cross Direction — Direction at right angles to the machine direction.

3.3 Machine Direction Tear — Tear parallel to the machine direction to the paper.

3.4 Cross Direction Tear — Tear made at right angle to the machine direction.

4. Apparatus

4.1 Tear Tester — Ballistic pendulum type, such as the Elmendorf type as illustrated in Fig. 1. The machine is provided with two clamps; one fixed and the other movable which is carried on a sector shaped pendulum, suspended from a column by means of a frictionless bearing located near the apex of the sector. A means is provided to hold the pendulum in the raised position and a lever to release the pendulum instantaneously. On releasing the pendulum, the centre tongue of the specimen is subjected to the load of pendulum recorded through a spring loaded friction pointer on the circumferential scale marked on the pendulum.

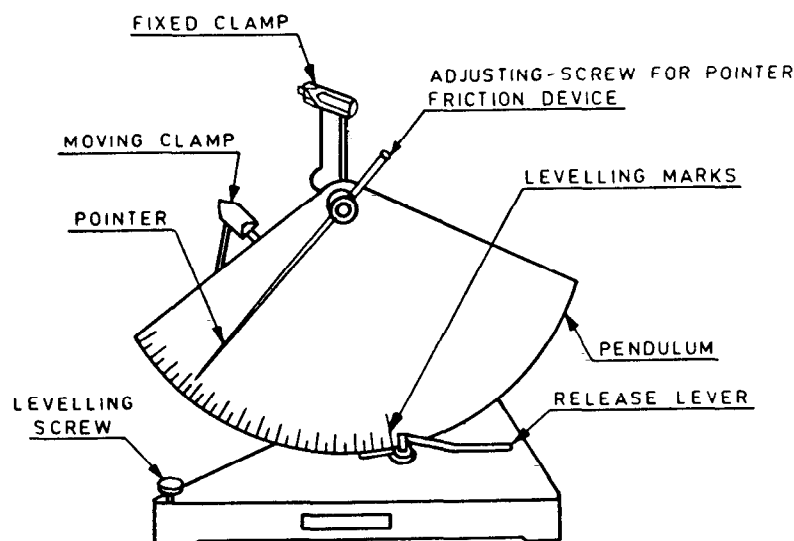


FIG. 1 GENERAL VIEW OF ELMENDORF TYPE TEARING STRENGTH TESTER

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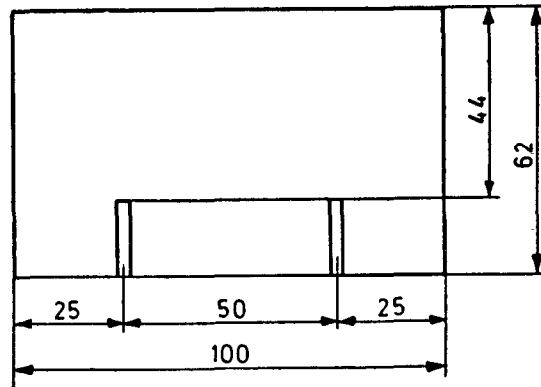
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5. Material — No material other than the test specimen is required for performing this test.

6. Test Specimen

6.1 A specimen approximately 100×62 mm shall be cut from the insulating paper, the smaller dimension being in the direction in which the paper has to be torn. By means of a suitable slitting device (which is usually provided with the apparatus) two slits shall be cut on one of the 100 mm edges at a distance of approximately 25 mm from each end, thus forming in the centre a tongue approximately 50 mm wide for insertion in the movable clamp, together with two outer tongues each of approximately 25 mm width for insertion in the fixed clamps. The length of these slits is immaterial provided that the distance from the end of each to the uncut 100 mm edge of the specimen is 44 mm. This distance of 44 mm represents the length to be torn and must be precise. A specimen containing the slits is illustrated in Fig. 2.



All dimensions in millimetres.

FIG. 2 TEST SPECIMEN SHOWING TONGUE

6.2 Number of Test Specimens — Five for each direction. More number of specimens may be taken, if required (see 8.2 and 8.5).

7. Conditioning — All the test specimens shall be conditioned at least for a period of 24 h at a relative humidity of 65 ± 2 percent and a temperature of $27 \pm 2^\circ\text{C}$, before this test is carried out.

8. Procedure

8.1 Before and after the test, the apparatus shall be checked to confirm that it operates correctly.

8.2 The tests may be made either on a single test piece or, if required, in packs of two or more test pieces simultaneously so adjusted that the reading is not less than 35 percent and not more than 90 percent of the capacity of the apparatus. This number of test pieces is then used for each of the tests.

8.3 Hold outer tongues of the test specimen in fixed clamps and the centre tongue in the movable clamp. The clamping should be done in such a way that sample is not strained, but a slight bend in the unclamped portion of the tongue is of no consequence. The lever is operated sharply to release the pendulum. As soon as the swing of the pendulum is complete and the specimen has been torn the pendulum may be brought to the rest by applying the brakes incorporated in the tester. The reading of the pointer on the scale is then recorded. Scale readings shall be taken to the nearest integer.

8.4 The test is carried out for both machine direction as well as cross direction of the insulating paper.

8.5 The tearing strength in each direction shall be taken as the arithmetic mean of five readings. A single divergent reading, differing by more than 20 percent from the mean, shall be excluded from the calculation. If two such divergent readings are obtained a further five tests shall be made. If no further divergent readings occur the original two shall be excluded. If additional divergent readings occur all ten readings shall be included in the average and the tearing strength of the paper shall be reported variable. The tearing strength of the paper shall be expressed in grams to the nearest gram.

8.6 The tearing strength of the samples (gf) is given by multiplying the actual reading of the scale by the constant of the apparatus and dividing by the number of test pieces torn simultaneously.

Note — Usually the constant of apparatus is 3.

9. Tabulation of Observations

Type of Insulating Paper:

Constant of the Instrument:

<i>Specimen No.</i>	<i>Direction</i>	<i>Scale Reading</i>	<i>Number of Papers Torn Simultaneously</i>
<i>Machine or Cross</i>			

10. Calculation

$$\text{Tearing strength, gf} = \frac{\text{Actual reading of the scale}}{\text{Number of papers torn simultaneously}} \times \text{Constant of the instrument}$$

11. Report**11.1 Reference Specification** _____

<i>Specimen No.</i>	<i>Type of Insulating Paper</i>	<i>Tear Strength, gf</i>	
		<i>Observed</i>	<i>Specified</i>

11.2 Conclusion — The specimen meets/does not meet the requirements of the specification.